

Unit 6 Loans & Payments

11/18/14

Expected completion 12/5/14

Please wrap up your Unit 5 test (15 min).

6.1 Single & Payday Loans

11/18/14

Define single and payday loans

Single payment loan -

paid off in one payment when the loan reaches maturity.
These loans are not paid off over time the way mortgages are paid.

maturity - when a loan comes due (must be repaid) in full

Payday loan -

A type of single payment loan which matures right after the next paycheck arrives (usually 14 days).

6.1 Single & Payday Loans

11/18/14

Why use a payday loan?

Convenience

- speed
- can get with bad credit
- only need a paystub
- can get in person, online, or via fax

Danger of payday loans

- Fees hide extremely high interest rates

6.1 Single & Payday Loans

11/18/14

IWBAT calculate the interest payment on single and payday loans and compare APR to EAR (effective annual rate). I will capture my thinking using the math note catcher including teacher and student-team modeled example problems on the Promethean board. I will demonstrate my understanding on my exit ticket.

6.1 Single & Payday Loans

11/18/14

Recall

APR = periodic interest rate * number of periods in a year

To calculate the APR of a payday loan you need the periodic interest rate.

$$\text{periodic interest rate} = \frac{\text{fee paid}}{\text{amount borrowed}}$$

$$\text{periods in a year} = \frac{52 \text{ weeks}}{\text{length of loan (usu. 2 weeks)}}$$

$$\text{APR} = .25 \cdot 26 = 6.5 \Rightarrow 650\%$$

IWBAT calculate the interest payment on single and payday loans and compare APR to EAR (effective annual rate).

6.1 Single & Payday Loans

11/18/14

You borrow \$1000 for two weeks and pay a fee of \$200.

What is the APR of this loan?

$$APR = \frac{200}{1000} \cdot \frac{52}{2} = .2 \cdot 26$$

$$APR = 5.2 \quad 520\%$$

IWBAT calculate the interest payment on single and payday loans and compare APR to EAR (effective annual rate).

6.1 Single & Payday Loans

11/18/14

Effective Interest Rate of a Single Payment Loan

This is the same as the effective interest rate of a credit card. That was calculated the same way as the Annual Percentage Yield on a savings account.

$$APY = \left(1 + \frac{APR}{n}\right)^n - 1$$

What is the effective interest rate of your \$1000 payday loan? APR 5.2

$$\left(1 + \frac{5.2}{26}\right)^{26} - 1 = 113.48\%$$

IWBAT calculate the interest payment on single and payday loans and compare APR to EAR (effective annual rate).

6.1 Single & Payday Loans

11/18/14

Typical Rates vs. Payday Loan Rate

Apex 6.1.1 p. 10 graphic

If you invested \$1000 at the effective interest rate of your payday loan, how much money would you have in one year?

$$I = 1000 \cdot 113.48 = \$113,480$$

$$\begin{array}{r} 1,000 \\ \hline \$114,480 \end{array}$$

IWBAT calculate the interest payment on single and payday loans and compare APR to EAR (effective annual rate).

6.1 Single & Payday Loans

11/18/14

Vocabulary: Appendix A.3 Key Terms

Practice: 6.1.2

Quiz 6.1.3

IWBAT calculate the interest payment on single and payday loans and compare APR to EAR (effective annual rate).

Period 2: Complete any missing work from Unit 5

**Period 4: Complete Student Perception Survey
(directions on back board)**

then

Complete any missing work from Unit 5

6.2 Installment Loans & Layaway

11/20/14

Calculate the APR and effective interest rate on a payday loan.

You borrowed \$500 with a fee of \$50 for one week.

$$\frac{50}{500} = .10 \quad 10\%$$

$$\text{APR} \quad .10 \times 52 = 5.20 \quad 520\%$$

$$\begin{array}{l} \text{EIR} \\ \text{or} \\ \text{APY} \end{array} \quad \left(1 + \frac{5.20}{52}\right)^{52} - 1 = 141.04$$

14,104%

6.2 Installment Loans & Layaway

11/20/14

How installment loans work

installment loan -

A loan with a set number of equal payments
which include principal and interest

What would you buy with an installment loan?

Car	house	cell phone
motorcycle	TV	wedding ring
boat	furniture	computer
Jet	college	

6.2 Installment Loans & Layaway

11/20/14

You are offered an installment loan on the purchase of a vehicle: \$45 per week for five years and the car, with a sticker price of \$9000, is yours.
Is this a good deal?

Total cost = payment\$ * payments per year * years

$$45 \cdot 52 \cdot 5 = \$11,700$$

Interest = total cost - sticker price

$$\$11,700 - \$9,000 = \$2,700$$

Markup rate = interest / sticker price

$$\frac{\$2,700}{\$9,000} = 0.3 \quad 30\%$$

6.2 Installment Loans & Layaway

11/20/14

IWBAT learn the process for buying something on layaway and calculate the number of weeks needed to pay off a debt or purchase. I will capture my thinking using the math note catcher including teacher and student-team modeled example problems on the Promethean board. I will demonstrate my understanding on my exit ticket.

6.2 Installment Loans & Layaway

11/20/14

Finding the APR

$$\text{\$sticker} \left(1 + \left(\frac{r}{n}\right)\right)^{n \cdot t} = \text{total cost}$$

n = number of payments per year

t = time in years

What was the APR on the automobile installment loan?

$$\frac{9000}{5000} \left(1 + \left(\frac{r}{52}\right)\right)^{52 \cdot 5} = \frac{11,700}{9000}$$

$$\left(1 + \left(\frac{r}{52}\right)\right)^{\frac{260}{-1}} = 1.3^{\frac{1}{-260}}$$

$$52 \cdot \frac{r}{52} = \left(1.3^{\frac{1}{260}} - 1\right) \cdot 52$$

$$r = \left(1.3^{\frac{1}{260}} - 1\right) 52$$

TVM Solver

$$N=5, PV=-9000$$

$$FV=11,700, P/Y=\cancel{52},$$

$$C/Y=52$$

$$I\% = \cancel{280.14} \quad \underline{5.25}$$

IWBAT learn the process for buying something on layaway and calculate the number of weeks needed to pay off a debt or purchase.

6.2 Installment Loans & Layaway

11/20/14

Layaway

You make a deposit on an item which you cannot afford immediately (usu. 5%-10%). The store or manufacturer sets the item aside. You make regular payments until the item is paid off. Then, and only then, do you receive your item.

Order the steps for layaway:

- ☐ You put down a deposit.
- ☐ The manufacturer puts your item away for safekeeping.
- ☐ You make regular payments until it is completely paid for.
- ☐ You receive your item.

IWBAT learn the process for buying something on layaway and calculate the number of weeks needed to pay off a debt or purchase.

6.2 Installment Loans & Layaway

11/20/14

Advantages and disadvantages

	Advantages	Disadvantages
Installment loan	Receive item right away	Pay interest
Layaway	No interest	Receive item after paid off

IWBAT learn the process for buying something on layaway and calculate the number of weeks needed to pay off a debt or purchase.

6.2 Installment Loans & Layaway

11/20/14

You have already made the down payment. How long will it take to pay off these items on layaway?

	Purchase		Length of Plan
5.4	A \$130 baby stroller for \$24 a week		4 weeks
7	An \$84 humidifier for \$12 a week		8 months
8	A \$760 bed for \$95 a month		6 months
3.5	A \$35 toaster for \$10 a week		6 weeks
5.3	A \$330 television for \$62 a month		7 weeks

IWBAT learn the process for buying something on layaway and calculate the number of weeks needed to pay off a debt or purchase.

6.2 Installment Loans & Layaway

11/20/14

Scheduling Layaway

You want to buy a \$360 Xbox 360 4GB Kinect for your boo for Christmas. You must pay 15% down and can afford \$25 per week. When should you put the gift on layaway? 12/24

$$\$360 \times .15 = \$54$$

$$360 - 54 = \$306$$

$$306 \div 25 = 12.24 \text{ wk (days 86)}$$

D N O S Week of 9/29
3 4 4 1
24 30 31 1

85

IWBAT learn the process for buying something on layaway and calculate the number of weeks needed to pay off a debt or purchase.

6.2 Installment Loans & Layaway

11/20/14

Vocabulary: Appendix A.3 Key Terms

Practice: 6.2.2

Quiz 6.2.3

IWBAT learn the process for buying something on layaway and calculate the number of weeks needed to pay off a debt or purchase.

6.3 Monthly Payments

11/21/14

Explain the process for buying on layaway.

Learn the term amortization.

To "bring to death" a loan - a systematic repayment of a loan through a set number of payments at a specific interest rate.

6.3 Monthly Payments

11/21/14

IWBAT derive and use the monthly payment formula and use technology to calculate the monthly payment. I will capture my thinking using the math note catcher including teacher and student-team modeled example problems on the Promethean board. I will demonstrate my understanding on my exit ticket.

6.3 Monthly Payments

11/21/14

How much to pay?

If you borrow \$5000 at 6% interest (APR) compounded monthly, how large would the monthly payment have to be to:

1. cover the interest?
2. pay off the loan in 10 years?
3. pay off the loan in 5 years?

Principal - *how much is borrowed*

Interest - *finance charges on the borrowed money*

Compounding - *build interest on top of money owed (principal + interest)*

IWBAT derive and use the monthly payment formula and use technology to calculate the monthly payment.

6.3 Monthly Payments

11/21/14

How much to pay?

If you borrow \$5000 at 6% interest (APR) compounded monthly, how large would the monthly payment have to be to:

1. cover the interest?

principal • periodic interest rate

$$\$5000 \cdot \left(\frac{.06}{12} \cdot 1 \right) = \$25$$

IWBAT derive and use the monthly payment formula and use technology to calculate the monthly payment.

6.3 Monthly Payments

11/21/14

Amortization table

If you borrow \$5000 at 6% interest (APR)
compounded monthly ... complete the table.

$I = \$25$
 $pmt > \$25$
 $\$50$

Payment number	Payment amount	Interest paid	Principal paid	Remaining balance
0				5000
1	50	25	25	4975
2	50	24.90	25.10	4949.90
3	50	24.75	25.25	4924.65

IWBAT derive and use the monthly payment formula
and use technology to calculate the monthly payment.

6.3 Monthly Payments

11/21/14

Amortization formula

$$M = \frac{Pr(1+r)^n}{(1+r)^n - 1}$$

M = monthly payment

P = principal

r = periodic interest rate

n = number of payments

IWBAT derive and use the monthly payment formula
and use technology to calculate the monthly payment.

6.3 Monthly Payments

11/21/14

How much to pay?

If you borrow \$5000 at 6% interest (APR) compounded monthly, how large would the monthly payment have to be to:

1. cover the interest?
2. pay off the loan in 10 years?

$$M = \frac{Pr(1+r)^n}{(1+r)^n - 1}$$

$$M = \frac{5000(0.005)(1+0.005)^{120}}{(1+0.005)^{120} - 1}$$

$$M = \$55.52$$

IWBAT derive and use the monthly payment formula and use technology to calculate the monthly payment.

6.3 Monthly Payments

11/21/14

How much to pay?

If you borrow \$5000 at 6% interest (APR) compounded monthly, how large would the monthly payment have to be to:

1. cover the interest?
2. pay off the loan in 10 years?
3. pay off the loan in 5 years?

$$M = \frac{Pr(1+r)^n}{(1+r)^n - 1}$$

$$m = \frac{5000(0.005)(1+0.005)^{60}}{((1+0.005)^{60} - 1)}$$

$$m = \$96.67 \quad \triangleleft \$111 \triangleright$$

$$\$55.52 \times 120 - 1.19 = \$6661.21$$

$$\$96.67 \times 60 - .59 = \$5741.20$$

IWBAT derive and use the monthly payment formula and use technology to calculate the monthly payment.

6.3 Monthly Payments

11/21/14

How much to pay?

If you borrow \$5000 at 6% interest (APR) compounded monthly, how large would the monthly payment have to be to:

3. pay off the loan in 5 years?

TVM Solver

$$N = 60$$

$$PV = 5000$$

$$PMT = ?$$

$$FV = 0$$

$$P/Y = 12$$

$$C/Y = 12$$

PMT: END

$$I\% = 6$$

$$\$96.67$$

IWBAT derive and use the monthly payment formula and use technology to calculate the monthly payment.

6.3 Monthly Payments

11/21/14

Vocabulary: Appendix A.3 Key Terms

Practice: 6.3.2

Quiz 6.3.3

IWBAT derive and use the monthly payment formula
and use technology to calculate the monthly payment.

Explain amortization.

a system of equal payments at regular intervals at a fixed percentage rate until the loan is paid off

IWBAT

- use the monthly payment formula to solve for the maximum loan amount,
- calculate the loan rate per period, and
- use technology to solve the loan amount in the monthly payment formula.

I will capture my thinking using the math note catcher including teacher and student-team modeled example problems on the Promethean board. I will demonstrate my understanding on my exit ticket.

6.4 Loan Pre-approvals

12/01/14

Use the monthly payment formula to solve for the maximum loan amount.

budget - how much money you set aside to spend each month

6.4 Loan Pre-approvals

12/01/14

Amortization formula

$$(1+r)^n - 1 \cdot M = \frac{Pr(1+r)^n}{(1+r)^n - 1}$$

$$\frac{m((1+r)^n - 1)}{r(1+r)^n} = \frac{Pr(1+r)^n}{r(1+r)^n - 1}$$

$$P = \frac{m((1+r)^n - 1)}{r(1+r)^n}$$

M = monthly payment

P = principal

r = periodic interest rate

n = number of payments

$$m = \$800$$

6.4 Loan Pre-approvals

Loan pre-approval formula

$$P = \frac{M((1+r)^n - 1)}{r(1+r)^n}$$

$$P = \frac{300((1+.005)^{24} - 1)}{(.005(1+.005)^{24})}$$

$$P = \$6768.86$$

$$n = 36 \quad \$9861.30$$

12/01/14

M = monthly payment

P = principal

r = periodic interest rate

n = number of payments

$$M = \$300$$

$$I\% = 6$$

$$r = \frac{.06}{12} = .005$$

$$t = 2$$

$$n = 24$$

6.4 Loan Pre-approvals

12/01/14

Calculate the value of a residence purchasable by someone making \$48,000/yr at 4.4%APR for 30 years.

$$P = \frac{M((1+r)^n - 1)}{r(1+r)^n}$$

$$P = \frac{10000((1+.0037)^{360} - 1)}{(.0037(1+.0037)^{360})}$$

$$n = 360$$

$$r = \frac{.044}{12} = .0037$$

$$M = \frac{48000}{12} \cdot .25 = \$1000$$

$$P = \$198,757.17$$

Median home price Denver \$281,000

IWBAT calculate the loan rate per period and use technology to solve the loan amount in the monthly payment formula.

6.4 Loan Pre-approvals

12/01/14

Calculate the value of a residence purchasable by someone making \$48,000/yr at 4.4%APR for 30 years.

TVM Solver

$$N = 360$$

$$I\% = 4.4$$

$$PV = 0 \quad \text{Clear - Alpha - Enter}$$

$$PMT = -1000$$

$$FV = 0$$

$$P/Y = 12$$

$$C/Y = 12$$

PMT: END

$$\$199,696.10$$

$$- 360,000$$

$$I = \$160,303.90$$

IWBAT calculate the loan rate per period and use technology to solve the loan amount in the monthly payment formula.

Vocabulary: Appendix A.3 Key Terms

Practice: 6.4.2

Quiz 6.4.3

Practice 6.4.2 #8-10: ... smallest to largest principal borrowed.

IWBAT calculate the loan rate per period and use technology to solve the loan amount in the monthly payment formula.

Use the monthly payment formula to solve for the maximum loan amount.

$$M = \frac{Pr(1+r)^n}{(1+r)^n - 1}$$

$$M = \$350$$

$$I\% = 6.2$$

$$t = 4 \text{ yr.}$$

$$n = 48$$

$$P = \frac{m((1+r)^n - 1)}{(r(1+r)^n)}$$

$$r = \frac{.062}{12} = .0054$$

$$P = \frac{350((1 + .0054)^{48} - 1)}{(.0054(1 + .0054)^{48})} = \$14,764.36$$

What are the differences between a credit scam and a credit scheme?

Scam - something people do to try to take your money (illegal)

Scheme - (legal) ways people use to take more of your money than you think you are paying

IWBAT

- Identify and describe various fraudulent practices related to consumer credit.
- Identify and describe high-cost credit practices.

I will capture my thinking using the math note catcher including teacher and student-team modeled example problems on the Promethean board. I will demonstrate my understanding on my exit ticket.

L19 Scams and Schemes

12/03/14

Review the differences between a credit scheme and a credit scam.

Scam

illegal
involuntary
no benefit
trick

Scheme

Legal
Voluntary
benefit

IWBAT identify and describe various fraudulent practices related to consumer credit and identify and describe high-cost credit practices.

Live within your means.

live with your available money
budgeting
put limits on spending
Needs vs. wants

IWBAT identify and describe various fraudulent practices related to consumer credit and identify and describe high-cost credit practices.

Avoiding scams

IWBAT identify and describe various fraudulent practices related to consumer credit and identify and describe high-cost credit practices.

Exit Ticket

Complete handout 19.2 and turn in before you leave class today.

IWBAT identify and describe various fraudulent practices related to consumer credit and identify and describe high-cost credit practices.

6.5 Deferred Payments

12/03/14

Define deferred payments

deferred payment - payments put off until a future date

0% APR for 6 months

This means no interest for 6 months. You will make payments on any money you borrow but will not be charged interest for a certain period of time (in this case 60 months).

Warning: If you are late on a payment, often the interest that was initially waived will be charged.

No payments for 6 months

"No payments" means interest accrues on your loan but you do not have to make any payments. In this case, there are no payments for 6 months.

Warning: Not making payments while interest accrues can be dangerous since when you start making payments your principal will be larger.

No payment or interest for 6 months

No payments and no interest is the best option since you are basically getting free money with no interest for a period of time.

Warning: These types of offers may have strict penalties or fees associated with them. Read the fine print!

6.5 Deferred Payments

12/03/14

IWBAT

- Explore situations where there is a deferral of principal and interest payments,
- Compare the advantages and disadvantages of deferred payments, and
- Consider school loans as a particular example of deferred payments.

I will capture my thinking using the math note catcher including teacher and student-team modeled example problems on the Promethean board. I will demonstrate my understanding on my exit ticket.

6.5 Deferred Payments

12/04/14

0% Interest

Stan's Autos offers 0% financing for 10 months on a car that costs \$12,000. The APR on the loan after 10 months will be 2.5%. You will be making monthly payments of \$208.92 for 5 years.

- How much will the car cost in total?

$$10 \times \$208.92 = \$2089.20$$

$$\$12,000 - 2089.20 = \$9910.80$$

$$M = \frac{9910.80 \left(\frac{.025}{12} \right) \left(1 + \frac{.025}{12} \right)^{50}}{\left(\left(1 + \frac{.025}{12} \right)^{50} - 1 \right)} = \$208.93$$

$$(208.93) 50 + 2089.20 = \$12,535.70$$

IWBAT explore situations where there is a deferral of principal and interest payments, compare the advantages and disadvantages of deferred payments, and consider school loans as a particular example of deferred payments.

6.5 Deferred Payments

12/04/14

0% Interest

Stan's Autos offers 0% financing for 10 months on a car that costs \$12,000. The APR on the loan after 10 months will be 2.5%. You will be making monthly payments of \$208.92 for 5 years.

- How much would it have cost without the 0% interest period?

$$\$12,000 \left(1 + \frac{0.025}{12}\right)^{60} = \$12,596.02$$

IWBAT explore situations where there is a deferral of principal and interest payments, compare the advantages and disadvantages of deferred payments, and consider school loans as a particular example of deferred payments.

6.5 Deferred Payments

12/04/14

No Payments

You head to Highway Auto, where they offer no payments for 10 months on the same car for \$12,000. The APR there is still 2.5%, and the loan is still for 5 years. Does the car cost more or less than at Stan's?

$$12000 \left(1 + \frac{.025}{12}\right)^{10} = \$12,252.36$$

$$M = \frac{12252.36 \left(\frac{.025}{12}\right) \left(1 + \frac{.025}{12}\right)^{50}}{\left(\left(1 + \frac{.025}{12}\right)^{50} - 1\right)} = \$258.29$$

$$50(258.29) = \$12,914.50$$

IWBAT explore situations where there is a deferral of principal and interest payments, compare the advantages and disadvantages of deferred payments, and consider school loans as a particular example of deferred payments.

6.5 Deferred Payments

12/04/14

No payments & 0% Interest

You find an offer for 0% APR and no payments for the first 10 months, with the same APR of 2.5% and loan length of 5 years? In this case, he is only shortening the length of the loan from 5 years, or 60 months, to 50 months. The monthly payment would be how large?

TVM solver

$$50(252.97) = \$12,648.50$$

$$N = 50$$

$$I\% = 2.5$$

$$PV = 12000$$

$$PMT = 0?$$

$$\$252.97$$

$$FV = 0$$

$$P/Y = 12$$

$$C/Y = 12$$

= END

IWBAT explore situations where there is a deferral of principal and interest payments, compare the advantages and disadvantages of deferred payments, and consider school loans as a particular example of deferred payments.

6.5 Deferred Payments

12/04/14

Offer	Monthly payment	Total
0% APR for 10 months with payments	\$208.93	\$12,535.70
Basic loan	\$212.97	\$12,779.20
No payments for 10 months	\$258.29	\$12,914.50
No payments or interest for 10 months	\$252.96	\$12,648.00

IWBAT explore situations where there is a deferral of principal and interest payments, compare the advantages and disadvantages of deferred payments, and consider school loans as a particular example of deferred payments.

6.5 Deferred Payments

12/04/14

Student Loans

subsidized - *does not collect interest while you are in school + 6 mo.*

unsubsidized - *collects interest from day one*

Examples:

→ Subsidized: Federal Stafford, Federal Perkins

Unsubsidized: Federal Stafford, Parent Plus, Graduate Plus

IWBAT explore situations where there is a deferral of principal and interest payments, compare the advantages and disadvantages of deferred payments, and consider school loans as a particular example of deferred payments.

6.5 Deferred Payments

12/04/14

Student Loans

You take out an unsubsidized loan of \$10,000 for your freshman year of college. You do not start paying on this loan until six months after graduation and you will make payments for twenty years. The interest rate is 8.8%. How large are your monthly payments?

$$10000 \left(1 + \frac{0.088}{12}\right)^{52} = \$14,622$$

$$N = 240$$

$$\$31,123.20$$

$$I\% = 8.8$$

$$PV = 14622$$

$$PMT = ? \quad \$129.68$$

$$FV = 0$$

$$P/Y = 12$$

$$C/Y = 12$$

IWBAT explore situations where there is a deferral of principal and interest payments, compare the advantages and disadvantages of deferred payments, and consider school loans as a particular example of deferred payments.

6.5 Deferred Payments

12/04/14

Vocabulary: Appendix A.3 Key Terms

Practice: 6.5.2

Quiz 6.5.3

IWBAT explore situations where there is a deferral of principal and interest payments, compare the advantages and disadvantages of deferred payments, and consider school loans as a particular example of deferred payments.

6.6 Paying Off

12/05/14

Give examples of situations in which payments may be deferred.

Car 0%, no 1st mo. pmt.

Furniture no pmt. up to 90 days

Student loans

- Subsidized - no interest until you start paying

- no payments until 6mo after grad.

{ 0% interest until ...

{ No payments until ...

{ 0% interest and No payments until ...

Review what we know about paying off loans.

Pay on time

Pay more than the minimum (when you can)

Don't get into too much debt
($< 20\%$ monthly income towards debt)

Budget

Look for the smallest APR you can find

Don't borrow too much

IWBAT

- Use the time-to-pay-off formula,
- Understand how the log function can be used to solve for n , and
- Investigate how the time to pay off changes as you vary the monthly payment, principal, and interest rate.

I will capture my thinking using the math note catcher including teacher and student-team modeled example problems on the Promethean board. I will demonstrate my understanding on my exit ticket.

6.6 Paying Off

12/05/14

You go to a store and purchase an \$800 TV, financed at 6% APR compounded monthly to be paid for in monthly installments of \$15. How long will it take to pay off the TV?

Estimate

$$\frac{\$800}{\$15/\text{mo}} = 53.\bar{3} \text{ mo}$$

54 mo

IWBAT use the time-to-pay-off formula, understand how the log function can be used to solve for n , and investigate how the time to pay off changes as you vary the monthly payment, principal, and interest rate.

6.6 Paying Off

12/05/14

Derive the Time to Pay Off formula

$$\overbrace{(1+r)^n - 1} M = \frac{Pr(1+r)^n}{(1+r)^n - 1} \cdot \frac{(1+r)^n - 1}{\log((1+r)^n) = \frac{\log m}{\log(m - Pr)}}$$

$$m(1+r)^n - m = Pr(1+r)^n + m$$

$$m(1+r)^n = Pr(1+r)^n + m$$

$$-Pr(1+r)^n - Pr(1+r)^n$$

$$m(1+r)^n - Pr(1+r)^n = m$$

$$(1+r)^n \frac{(m - Pr)}{m - Pr} = \frac{m}{m - Pr}$$

$$n \frac{\log(1+r)}{\log(1+r)} = \frac{\log\left(\frac{m}{m - Pr}\right)}{\log(1+r)}$$

$$n = \frac{\log\left(\frac{m}{m - Pr}\right)}{\log(1+r)}$$

IWBAT use the time-to-pay-off formula, understand how the log function can be used to solve for n, and investigate how the time to pay off changes as you vary the monthly payment, principal, and interest rate.

6.6 Paying Off

12/05/14

You go to a store and purchase an \$800 TV, financed at 6% APR compounded monthly to be paid for in monthly installments of \$15. How long will it take to pay off the TV?

Use the Time to Pay Off formula

$$n = \frac{\log \left(\frac{15}{15 - 800 \left(\frac{.06}{12} \right)} \right)}{\log \left(1 + \frac{.06}{12} \right)} = 62.2 \text{ mo}$$

63 mo

IWBAT use the time-to-pay-off formula, understand how the log function can be used to solve for n, and investigate how the time to pay off changes as you vary the monthly payment, principal, and interest rate.

6.6 Paying Off

12/05/14

You go to a store and purchase an \$800 TV, financed at 6% APR compounded monthly to be paid for in monthly installments of \$15. How long will it take to pay off the TV?

Use the TVM Solver

$$N = 0? \quad 62.2 \text{ mo}$$

$$I\% = 6 \quad 63 \text{ mo}$$

$$PV = 800$$

$$PMT = -15$$

$$FV = 0$$

$$P/Y = 12$$

$$C/Y = 12$$

IWBAT use the time-to-pay-off formula, understand how the log function can be used to solve for n , and investigate how the time to pay off changes as you vary the monthly payment, principal, and interest rate.

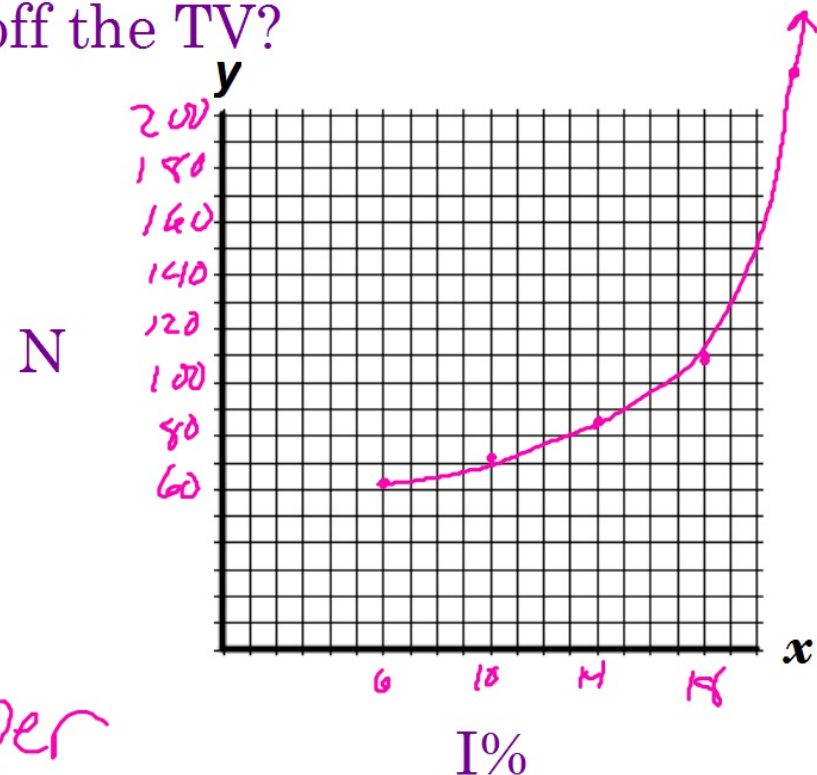
6.6 Paying Off

12/05/14

You go to a store and purchase an \$800 TV, financed at 6% APR compounded monthly to be paid for in monthly installments of \$15. How long will it take to pay off the TV?

Using the TVM Solver, at what interest rate will you never be able to pay off the TV?

I%	N
6	63
10	71
14	84
18	109
22	210
24	err — Never



IWBAT use the time-to-pay-off formula, understand how the log function can be used to solve for n, and investigate how the time to pay off changes as you vary the monthly payment, principal, and interest rate.

6.6 Paying Off

12/05/14

You go to a store and purchase an \$800 TV, financed at 6% APR compounded monthly to be paid for in monthly installments of \$15. How long will it take to pay off the TV?

Using the TVM Solver, adjust the PMT to find the new N.

Monthly Payment	<i>n</i>
\$15	63
\$20	45
\$30	29
\$40	22
\$50	17

IWBAT use the time-to-pay-off formula, understand how the log function can be used to solve for n , and investigate how the time to pay off changes as you vary the monthly payment, principal, and interest rate.

6.6 Paying Off

12/05/14

You go to a store and purchase an \$800 TV, financed at 6% APR compounded monthly to be paid for in monthly installments of \$15. How long will it take to pay off the TV?

Which will reduce the time to pay off more: increasing payments to \$20 or reducing the interest rate to 5%?

6% \$20 45mo

5% \$15 61mo

5% \$20 44mo

IWBAT use the time-to-pay-off formula, understand how the log function can be used to solve for n , and investigate how the time to pay off changes as you vary the monthly payment, principal, and interest rate.

6.6 Paying Off

12/05/14

Unit Test: Tuesday, 12/9/14

Vocabulary: Appendix A.3 Key Terms

Practice: 6.6.2

Quiz 6.6.3

IWBAT use the time-to-pay-off formula, understand how the log function can be used to solve for n , and investigate how the time to pay off changes as you vary the monthly payment, principal, and interest rate.

6.7 Prepayment

12/08/14

How does the time to pay off change as you vary the monthly payment, principal, and interest rate?

$m \uparrow$

$t \downarrow$

$P \uparrow$

$t \uparrow$

$I \uparrow$

$t \uparrow$

6.7 Prepayment

12/08/14

What does prepayment mean?

You make a payment before the payment is due

Usually used to pay down or pay off a loan early

IWBAT

- Derive the prepayment formula,
- Understand how prepayment affects the loan, and
- Calculate the amount needed to pay off a loan after a certain time period.

I will capture my thinking using the math note catcher including teacher and student-team modeled example problems on the Promethean board. I will demonstrate my understanding on my exit ticket.

6.7 Prepayment

12/08/14

Prepayment formula

$$A = P(1 + r)^h + M \left[\frac{1 - (1 + r)^h}{r} \right]$$

Two new variables:

h = number of payments already made

A = unpaid balance after the h^{th} payment

r = periodic interest rate

IWBAT derive the prepayment formula, understand how prepayment affects the loan, and calculate the amount needed to pay off a loan after a certain time period.

6.7 Prepayment

12/08/14

You have taken out student loans totalling \$120,000 over your four years for your Bachelor's degree. You are repaying the loans over a period of 25 years at an APR of 8%.

- What is your monthly payment?

$$M = \frac{P r (1+r)^n}{((1+r)^n - 1)} = \frac{120000 \left(\frac{.08}{12}\right) \left(1 + \frac{.08}{12}\right)^{300}}{\left(\left(1 + \frac{.08}{12}\right)^{300} - 1\right)}$$

$$m = \$926.18$$

IWBAT derive the prepayment formula, understand how prepayment affects the loan, and calculate the amount needed to pay off a loan after a certain time period.

6.7 Prepayment

12/08/14

You have taken out student loans totalling \$120,000 over your four years for your Bachelor's degree. You are repaying the loans over a period of 25 years at an APR of 8%.

- How much do you still owe after 15 years? $h=180$
- After 18 years? $h=216$

Use the prepayment formula

$$A = P(1+r)^h + M \left[\frac{1-(1+r)^h}{r} \right]$$
$$A = 120000 \left(1 + \frac{.08}{12}\right)^{180} + 926.18 \left(\frac{1 - \left(1 + \frac{.08}{12}\right)^{180}}{\left(\frac{.08}{12}\right)} \right)$$

$$A(180) = \$76,336.90$$

$$A(216) = \$59,122.74$$

IWBAT derive the prepayment formula, understand how prepayment affects the loan, and calculate the amount needed to pay off a loan after a certain time period.

6.7 Prepayment

12/08/14

You have taken out student loans totalling \$120,000 over your four years for your Bachelor's degree. You are repaying the loans over a period of 25 years at an APR of 8%.

Use the TVM solver & bal(

$$N = 300$$

$$I\% = 8$$

$$PV = 120000$$

$$PMT = ? - 926.18$$

$$FV = 0$$

$$P/Y = 12$$

$$C/Y = 12$$

$$PMT:END$$

Quit
Apps 1) Finance
9) bal(

$$bal(180) = \$76337.09$$

$$bal(216) = \$59,423$$

IWBAT derive the prepayment formula, understand how prepayment affects the loan, and calculate the amount needed to pay off a loan after a certain time period.

6.7 Prepayment

12/08/14

Norah took out a 20-year loan for \$87,000 at an APR of 7.8%, compounded monthly. Answer the following four questions about her loan. $M = 716.92$ $h = 156$ $n = 240$

- How much in total will Norah have paid after 13 years?
- What will be the remaining balance on Norah's loan after 13 years?
- What will be the total cost of Norah's loan if she pays it off 7 years early?
- How much will Norah have saved by paying off the loan 7 years early?

Use the TVM solver and bal(

- After 13 years, Nora will have paid \$111,839.52.
- Nora will still owe \$46,291.90.
- To pay the last 7 years off at once, the total loan will cost her \$158,131.42.
- Nora saved $\$172,060.80 - \$158,131.42 = \$13,929.38$.


IWBAT derive the prepayment formula, understand how prepayment affects the loan, and calculate the amount needed to pay off a loan after a certain time period.

6.7 Prepayment

12/08/14

Use your cellphone or computer to respond.

Which unit would you like to study next in Financial Algebra s2?

 When poll is pushed, respond at PollEv.com/upbeatbriars396

 Text a **CODE** to 22333

Automobile purchasing **425852**

House purchasing **425859**

Insurance & Retirement **425860**

0



powered by Poll Everywhere

Live Audience Polling